

Machine vision in poor visibility conditions

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Abstract. Machine vision is a scientific digitization direction in the field of artificial intelligence, which allows technologies of various categories to obtain images of real objects, process them and use them in solving applied problems of various levels. A feature of this technology is the possibility of complete or partial object recognition without human participation. Machine vision in poor visibility conditions is a relatively new area of research and development. It has become especially relevant in recent years with the development of autonomous vehicles, outdoor video surveillance and other areas where poor visibility can cause serious problems for the safety and efficiency of systems. The article discusses the features of using machine vision based on camera and lidar technologies. The use of camera-based machine vision and lidar technology continues to develop, which determines the scientific novelty of this article. The purpose of the study is to study the use of machine vision technologies in conditions of poor visibility. The methodology of scientific research is based on the analysis of scientific data, comparative analysis, data synthesis, graphical interpretation. The result of the study is the identification of the features of the introduction of lidars into machine vision technology. In the article the prospects for development are determined and researches in this area are overviewed.

Keywords: machine vision, camera, radar, lidar, cloud, image, object recognition, field of artificial intelligence

REFERENCES

1. Zakharov V.S. Computer vision technologies in the Russian and world market and their prospects. *Vestnik Taganrogskogo instituta upravleniya i ekonomiki* [Bulletin of the Taganrog Institute of Management and Economics]. 2022. No. 1. Pp. 114–115. (In Russian)
2. Shumsky S. *Mashinnyy intellekt. Ocherki po teorii mashinnogo obucheniya i iskusstvennogo intellekta* [Machine intelligence. Essays on the theory of machine learning and artificial intelligence]. Moscow: RIOR, 2022. 340 p. (In Russian)
3. Goryachkin B.S., Kitov M.A. Computer vision // *E-Scio*. 2020. No. 9(48). Pp. 317–345. EDN EBYPIO. (in Russian)
4. Orlov S.P., Susarev S.V., Morev A.S. Technical vision system for an autonomous agricultural vehicle. *Materialy VI Vserossiyskoy nauchno-tekhnicheskoy konferentsii* [VI All-Russian Scientific and Technical Conference]. Chelyabinsk, 2020. (In Russian)
5. Silyunin V.A., Smytsko M.V. The use of computer vision in automated robotics for health protection. *Molodoy uchenyy* [Young scientist]. 2021. No. 22(364). Pp. 121–123. (In Russian)
6. Kreyman G. *Biologicheskoye i komp'yuternoye zreniye* [Biological and computer vision]: trans. from English. I. L. Lyusko; edited by T. B. Kiseleva, T.I. Lyusko. Moscow: DMK Press, 2022. 314 p. (In Russian)
7. Christopher M. Bishop. *Raspoznavaniye obrazov i mashinnoye obucheniye* [Bishop image Recognition and Machine Learning]. Moscow: Dialektika, 2020. 962 p. (In Russian)
8. Bakshansky R.Yu. Visualization of fast processes using a machine vision camera. *Izbrannyye doklady 67-y Universitetskoy nauchno-tekhnicheskoy konferentsii studentov i molodykh uchenykh*. Tomsk, 19–23 April, 2021. Pp. 327–328. EDN: KRVI BP. (In Russian)
9. Iskrov N.S., Buryak D.V., Kasimov G.E. About the OpenCV Library for the implementation of a machine vision system in conditions of poor visibility under water. *Materialy XXVI Mezhdunarodnoy nauchno-prakticheskoy konferentsii, posvyashchennoy pamyati general'nogo konstruktora raketno-kosmicheskikh sistem akademika M.F. Reshetneva*. Part 2, ed. Yu.Yu. Loginova. Krasnoyarsk, 2022. (In Russian)

10. Kuutti S., Fallah S., Katsaros K., et al. Review of modern methods of localization and their potential for application in unmanned vehicles. *Izbrannyye doklady 4-oy Aziatsko-Tikhookeanskaoy konferentsii po intellektual'nyim robotizirovannym sistemam*. 2022. Pp. 829–846. (In Russian)

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